

On the specific names of the Japanese moles of the genus *Mogera* (Insectivora, Talpidae)

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Abstract. The original designation of the lectotype of *Mogera wogura* (Temminck, 1842) by Corbet (1978) is incomplete, but the specimen RNH28684 which Corbet probably intended to designate is taken as the lectotype. Moles from the southern half of the Japanese main islands well coincide with RNH28684 in important diagnostic characters. Thus the name *M. wogura* should be given to these moles as concluded in Abe (1995). The name *M. minor* Kuroda, 1936 which Abe (1995) adopted for the moles found in the northern half is invalid and should be changed to *M. imaizumii* (Kuroda, 1957) in accordance with the Article 59b of the International Code of Zoological Nomenclature, the third edition (1985). Except for the name alternation from *M. minor* to *M. imaizumii*, there is nothing to change the synonym list for this species and for *M. wogura* in Abe (1995).

Key words: *Mogera imaizumii*, *Mogera minor*, *Mogera wogura*, taxonomic revision.

Three species of *Mogera* Pomel, 1848 occur in Japan: *M. wogura* (Temminck, 1842) occupying the southern part of the main islands, *M. minor* Kuroda, 1936 (= *M. imaizumii* (Kuroda, 1957) as revised in this paper) found in the northern part except Hokkaido, and *M. tokudae* Kuroda, 1940 restricted to Sado Island and a part of Echigo Plain in northwestern Honshu (Abe 1995). In the taxonomic revision of *Mogera*, Abe (1995) employed the type series of specimens as the type of *M. wogura*, without comments on the lectotype which was inadequately designated by Corbet (1978). This procedure, however, is not sufficient and remains some vagueness. One of us (HA), consequently, re-examined in detail some of the important diagnostic characters of the type series. One of the purposes of this paper is to give the result of the examination. *M. minor* which is adopted in Abe (1995) for the northern species is not correct on reference to the International Code of Zoological Nomenclature (ICZN), the third edition (1985), so that revising of the name is the other purpose of this paper. Another species, *M. tokudae* is excluded from the present discussion, because of the very different characters from those of the type series and also from the above two species (Abe 1995).

MATERIALS AND METHODS

The type series of *Talpa wogura* (= *M. wogura*) from "Japan" without specified localities (Temminck 1842) in the Rijksmuseum van Natuurlijke Historie (RNH) in Leiden and the British Museum (Natural History)(now Natural History Museum) (BM) in London, and all the other specimens of Japanese moles used by Abe (1995) were examined. In addition to the above, twelve specimens housed in the Hokkaido University (HU) and the National Science Museum, Tokyo (NSMT) were also examined: four specimens (HU, A5846-5849) from Sano, Tochigi Prefecture; five specimens (NSMT M1637, 7597, 8510, 9424, 15808) from Tokyo; two specimens (NSMT M1633, 1639) from Tochigi Prefecture; and one specimen (NSMT M11890) from Ushikunuma, Ibaraki Prefecture.

The southern species (*M. wogura*) is generally larger than the northern one (*M. imaizumii*), but the size is geographically variable (Abe 1967). The most effective diagnostic characters for them are; 1) the difference between the length of upper tooth row (I^1-M^3) and the length from the front margin of upper canine to the rear margin of the third upper molar ($C-M^3$), 2) the degree of projection of upper incisor row, calculated as percentage of the difference between I^1-M^3 and $C-M^3$ to the rostral width at canines (data were arcsin-root transformed to compare with those of Abe 1995), and 3) the shape of the upper incisor row. The southern species has a round arc-like upper incisor row, a smaller difference between I^1-M^3 and $C-M^3$, and a smaller degree of projection of the upper incisor row, in contrast to a V-shaped upper incisor row, a larger difference between I^1-M^3 and $C-M^3$, and a larger degree of projection of the upper incisor row in the northern species (Abe 1967, 1995).

Since these diagnostic characters become less effective with advancing age (Abe 1967, 1995), all the skull specimens examined were assessed as belonging to one of four age classes (=ac I-IV) following the methods of Hoslett and Imaizumi (1966) and Abe (1967), and the specimens of ac III and IV were not used in the graphical comparison. The greatest length of skull (GL in mm) was used as the size character to examine graphically the relationship with the difference between I^1-M^3 and $C-M^3$, and with the degree of projection of upper incisor row.

For the broken skulls in the type series of which GL could not be measured, their GLs were estimated from the following regression formulas with the length of mandibles (LM in mm) of 32 specimens of *M. wogura* (ac I and II) from Kyushu and 32 specimens of *M. imaizumii* (ac I and II) from Nagano and Miyagi Prefectures, Honshu: A, for *M. wogura*, $GL = 8.598 + 1.200LM$ ($r^2 = 0.860$) and B, for *M. imaizumii*, $GL = 9.048 + 1.167LM$ ($r^2 = 0.942$). In these two regression formulas, there are no significant differences between the regression coefficients (ANCOVA: $p = 0.076$) and also between the variances (ANCOVA: $p = 0.847$).

Of the 17 specimens carrying skulls in the type series, RNH16244 (ac II),

RNH16249 (ac I, published as "lectotype" by Corbet 1978), RNH16250 (ac I), and RNH28696 (ac I) retain complete skulls, while skulls of RNH16245 (ac I), RNH28682 (ac I), RNH28684 (ac II, intended as lectotype by Corbet 1978, see Discussion), RNH28694 (ac II), RNH28695 (ac I), and RNH28699 (ac II) are incomplete and their GLs are estimated by the formula A or by the two formulas (A and B). Four aged specimens (ac III and IV, RNH16246-8 and RNH28698) and three incomplete specimens (ac I, RNH28697 carrying only mandible, RNH28700 carrying a broken skull but lacking mandible, and BM43 12 27 5 carrying a broken skull with mandible) were not used in the graphycal comparison.

RESULTS

As indicated in Figs. 1 and 2, RNH16249 which was designated as the "lectotype" of *M. wogura* by Corbet (1978) and four paralectotypes (RNH16245, 16250, 28695, 28696) in age class I well coincides with small forms of the southern mole in Tanegashima Island, Yakushima Island, Tsushima Island and a part of Kyushu, although one of the four paralectotypes (RNH16250) is somewhat marginal in position. The shape of the upper incisor row in RNH16249 and the four paralectotypes is typically round arc-like, and well corresponds to that of the southern species.

In Figs. 1 and 2, parts of Shiojiri (e) and Nakano (f) populations in the northern species overlap with Yakushima (C) population and the smaller form of Kyushu (D) population in the southern species. However, the geographical range of these northern mole populations is far from that of the southern mole populations, and in case that the two species occur proximately, the size is very different such as between the Shiojiri population (e) of the northern species and the Ina population (G) of the southern one, and between the northern one in Agematsu (d) and the very large southern one in Kiso (I).

One paralectotype (RNH28682), the largest specimen in the type series of skulls, on the other hand, is clearly excluded from the group of the southern species and is close to the larger form of the northern species such as of Kanto Plain (g), Sendai Plain (Semine, h) or the larger individuals of northwestern Honshu (c) (Figs. 1 and 2). The upper incisor row of RNH28682, however, is rather deep arc-like as found in young and small individuals of the southern species.

In Figs. 3 and 4, RNH28684 which Corbet (1978) probably intended to designate as the lectotype of *M. wogura* (see Discussion) is marginal for both of the species, *i. e.* this specimen is included in the range of Nakano (f) population of the northern species or very close to the population of Yakushima Island (C) and to the smaller individuals of Kyushu (D) and Hiroshima (E) populations. The shape of the upper incisor row, however, is clearly round arc-like, and is the same as that of RNH16249 and as that of the southern species, although the arc is slightly shallower in RNH28684 due to the advanced age (ac II). Thus, RNH28684 is likely a specimen of the southern species, but not of the northern

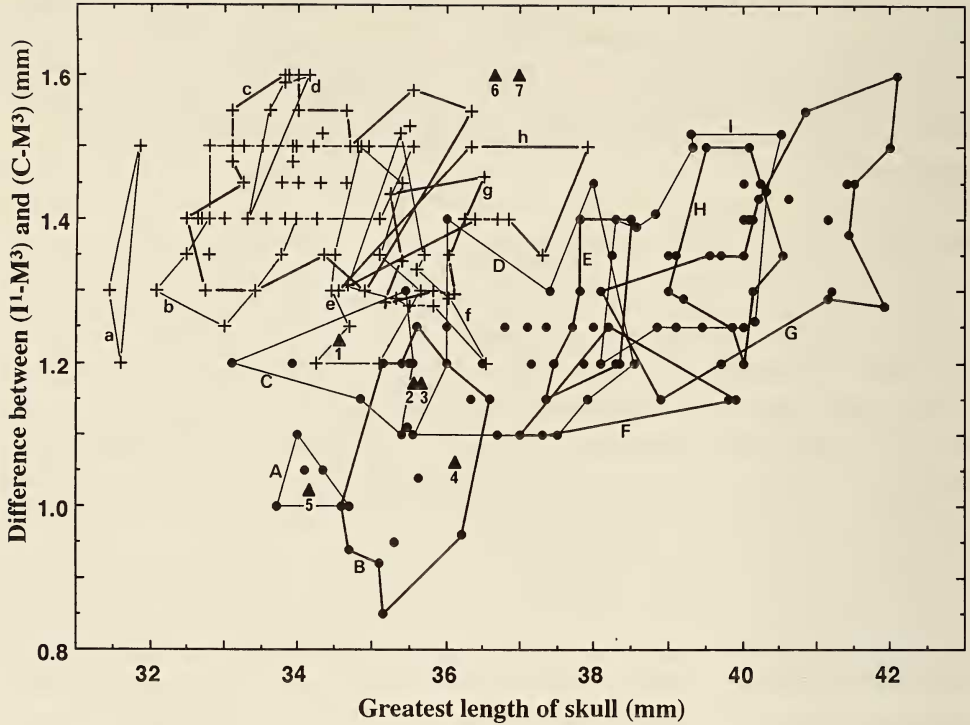


Fig. 1. The relationship between the difference in length of I¹-M³ from C-M³ and the greatest length of the skull of two species of moles (age class I). For locations V.=village, T.=town, and C.=city. Closed triangles: paralectotypes of *M. wogura*, 1=RNH16250, 2=RNH16245 (GL was estimated from formula A), 3=RNH28695 (GL from formula A), 4=RNH28696, 5=RNH16249, published as "lectotype" of *Mogera wogura* by Corbet (1978), 6 and 7=RNH28682, GL of the 6 from formula B, GL of the 7 from formula A; closed circles: moles from the southern half of the Japanese main islands (*M. wogura*, Abe 1995), A=Tanegashima, B=Tsushima, C=Yakushima, D=Kyushu, E=Hiroshima Prefecture, F=Tokushima Prefecture, G=Ina Valley including Iida C., Chiyo V., Shiojiri C., Tatsuno T., Nagano Prefecture, and Iwata C., Gotenba C., Shizuoka Prefecture, H=Okinoshima, I=Kiso Valley including Ohkuwa V., Yomikaki V., Agematsu T., Nagano Prefecture, and Inazawa C., Aichi Prefecture; crosses: moles from the northern half of the Japanese main islands (*M. imaizumii* as defined in this paper), a=Mt. Tsurugi, Tokushima Prefecture, b=Iwate and Aomori Prefectures, c=Northeastern Honshu including Fukushima, Niigata, and Ishikawa Prefectures, d=Kiso Valley including Agematsu T., Kisofukushima T., Kiso V., Nagano Prefecture, e=Shiojiri C. including Soga V., Nagano Prefecture, f=Nakano C. including Wada V., Nagano Prefecture, g=Kanto Plain including Tokyo, Tochigi and Ibaraki Prefectures, h=Sendai Plain (Semine), Miyagi Prefecture.

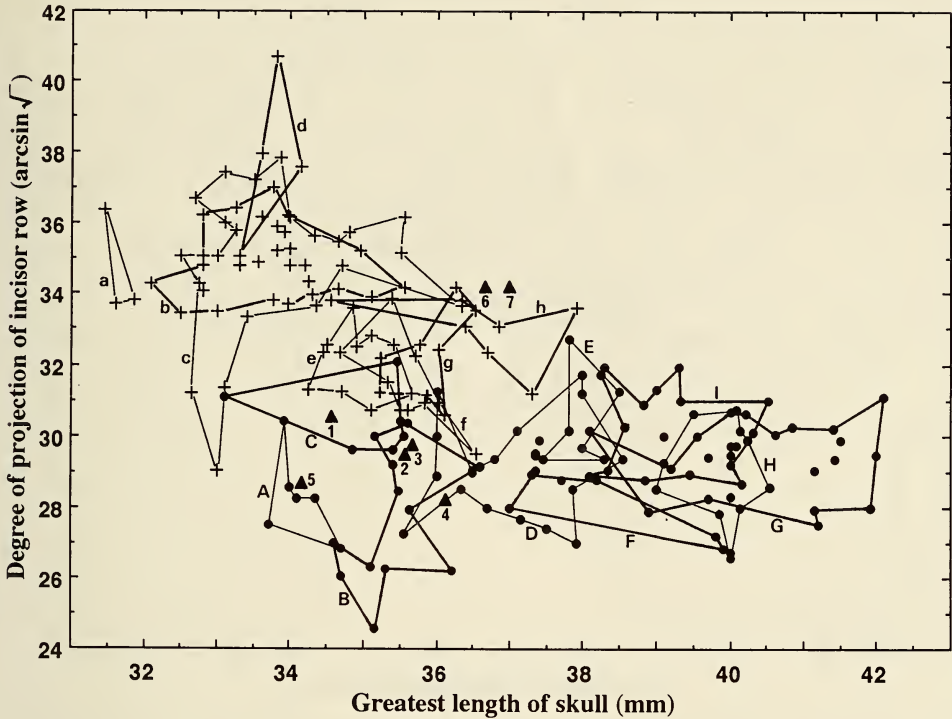


Fig. 2. The relationship between the arcsin-root transformed degree of projection of the incisor row and the greatest length of the skull (age class I). Refer to Fig. 1 for legends.

one. Three paralectotypes (RNH16244, 28694, 28699) in the age class II have arc-like upper incisor row and are included in the group of the southern species in Figs. 3 and 4.

Four aged paralectotypes (ac III and IV, RNH16246-8, 28698) have small differences (0.85-1.11 mm) between I¹-M³ and C-M³ and relatively small degrees (25.03-28.66 degree) of projection of the upper incisor row ; those of RNH28700 (ac I) and BM43 12 27 5 (ac I) were 1.18 mm, 1.14 mm, 30.85 degree and 28.40 degree, respectively. All these data agree with the diagnostic characters of the southern species.

DISCUSSION

One of us (HA) found that the specimen RNH28684 carried a label noted as the "lectotype". This finding does not agree with the lectotype designation by Corbet (1978). Concerning the lectotype designation of *M. wogura*, Corbet (1978) stated as follows: ". . . . I therefore select specimen *d*, also numbered 16249, as the lectotype of *Talpa wogura* Temminck. The skull of this specimen has been removed and has the following measurements: upper tooth-row

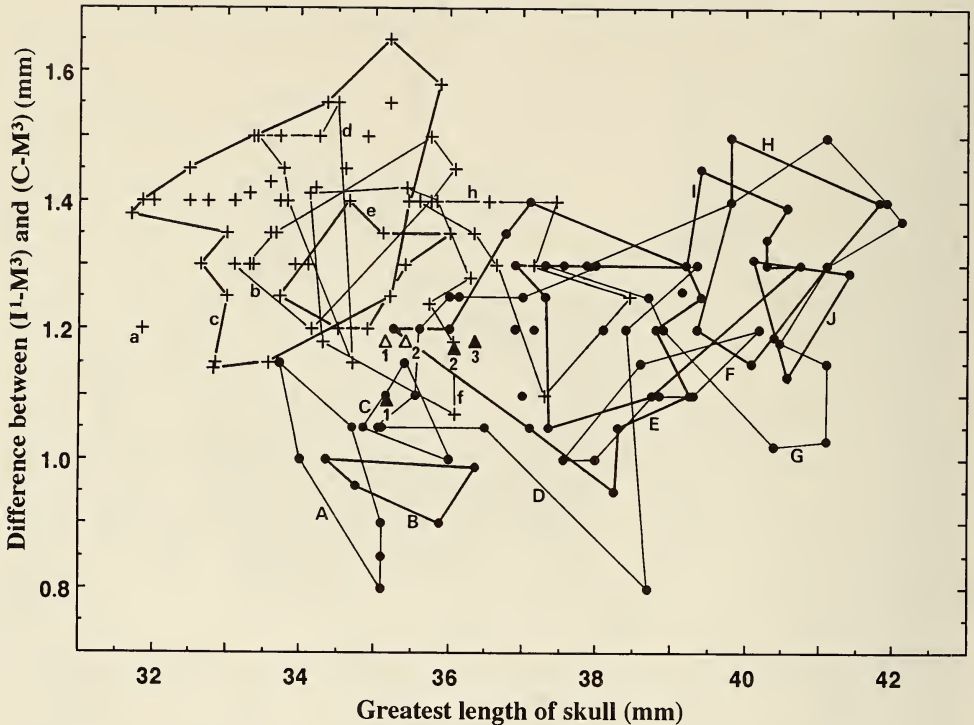


Fig. 3. The relationship of the difference between I^1-M^3 and $C-M^3$ and the greatest length of the skull in the two species of moles (age class II). Open triangles: RNH28684, intended as lectotype of *M. wogura* by Corbet (1978), GL of the 1 was estimated from formula B, GL of the 2 from formula A; closed triangles: paralectotypes of *M. wogura*, 1=RNH28694, GL from formula A, 2=RNH28699, GL from formula A, 3=RNH16244; closed circles: moles from the southern half of the Japanese main islands (*M. wogura*, Abe 1995), refer to Fig. 1 for A-I, J=Nara Prefecture. Refer to Fig. 1 for crosses.

14.3 mm; length of mandible 22.5 mm.” This measurements almost completely agree with those (14.34 mm and 22.36 mm, measurement by HA) of RNH28684. On the other hand, those of RNH16249 are 13.87 mm and 21.82 mm (by HA), respectively, which are apparently different from those given by Corbet (1978). Corbet (1978), at this time, did not give a measurement of GL or the condylobasal length which is usually employed as a size character, probably because of the broken skull which he measured. As mentioned earlier, the skull of RNH28684 is partly broken, while that of RNH16249 is perfectly reserved. Thus, it is sure that he intended to designate RNH28684 as the lectotype of *M. wogura*. This intermingled designation of the lectotype by Corbet (1978) might be caused by “d”-designated two specimens: RNH16249 (*d*: skull and skeleton, Jentink 1887) and RNH28684 (*d*: skull and skin, Jentink 1888).

In spite of the original intention of Corbet (1978), RNH16249 is regarded as

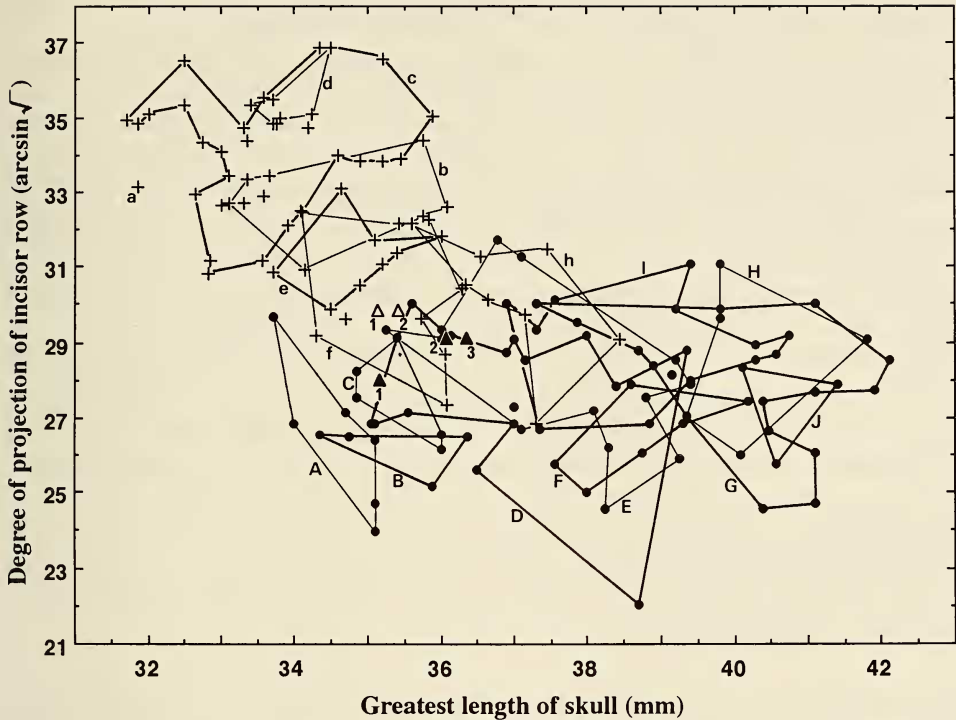


Fig. 4. The relationship between the arcsin-root transformed degree of projection of the incisor row and the greatest length of the skull (age class II). Refer to Fig. 3 for legends.

the lectotype, unless a correction of Corbet's designation is made to exactly indicate RNH28684 as the lectotype. Here we do correct the confusion and confirm RNH28684, for which Corbet (1978) described the set of skin and skull with some measurements, to be the lectotype of *M. wogura*. The two diagnostic characters of the lectotype are somewhat marginal for the southern species but the arc-like shape of the upper incisor row, another diagnostic character, well coincides with that of the southern species. Thus the southern larger moles in Japan are certainly identified as *M. wogura* as concluded in Abe (1995).

The largest skull specimen (RNH28682, ac I) of which the estimated GL is 37.00 mm by formula A or 36.67 mm by formula B, coincides or does not contradict in two characteristics of the upper incisor row with the northern mole species (Figs. 1 and 2). However, the arc-like arrangement of upper incisor row of RNH28682 resembles further that of young specimens of the southern species rather than that of young specimens of the northern species. In the northern species, this type of upper incisor row is found only in older specimens (Abe 1967). The large value of projection degree of upper unicuspid row might be produced by the relatively small measurements of C-M³ due to the broken canines of RNH28682. This skull retains only roots of both canines

lacking crown part of the teeth. Thus the extraordinary values expressed in Figs. 1 and 2 must be an artifact in the measurement of C-M³. Consequently, RNH28682 is also identified as one of the southern species.

As discussed by Abe (1995) the northern species had been called *M. wogura* by some taxonomists including Imaizumi (1949, 1960, 1970), Abe (1967) and Hutterer (1993), since Kuroda (1940) erroneously assigned Yokohama, Honshu as the type locality of *M. wogura*. Abe (1995) corrected this confusion and used *M. minor* as the name of this mole, which had been originally described by Kuroda (1936) as *M. wogura minor* for a small local form from Shiobara, northern Kanto in the range of the northern species. However, it became clear that the above treatment adopting *M. minor* was not correct referring to ICZN (1985). After Schwarz (1948) and Ellerman and Morrison-Scott (1951) made lumping of *Mogera* spp. into *Talpa micrura*, Kuroda (1957) renamed *T. micrura minor* as *T. micrura imaizumii* to revise the "minor" preoccupied in *Talpa europaea* var. *minor* Freudenberg, 1914. From this procedure only the name of *M. imaizumii* (Kuroda, 1957) became the valid name for the northern species according to the Article 59b of ICZN (1985). Thus, *M. wogura minor* Kuroda, 1936 and then *M. minor* Kuroda, 1936 of Abe (1995) had been completely invalid at the time when the third edition (1985) of ICZN was published. Concerning to *Mogera wogura gracilis* from Nikko, central Honshu (Kishida 1936), no valid description has been known.

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